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•San Bernardino County Transportation Commission •San Bernardino County Transportation Authority
•San Bernardino County Congestion Management Agency •Service Authority for Freeway Emergencies

DATE: November 10, 2011

TO: Contractors

FROM: San Bernardino Associated Governments

SUBJECT: Addendum #4 – to IFB 12010 for I-15 La Mesa Nisqualli Interchange Project, San Bernardino County, in the City of Victorville, California

Addendum No. 4 is hereby issued to the following documents for I-15 La Mesa Nisqualli Interchange project in San Bernardino County, in the City of Victorville, California.

- Invitation For Bids (IFB) C12010
- Special Provisions
- Plans

This Addendum is being issued to revise the above listed documents.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this Addendum No. 4 are an essential part of the contract, and the contract documents to be executed will contain a copy of this addendum.

Indicate receipt of this Addendum by filling in the addendum number in the space provided on the Addenda section of the Bid to the San Bernardino Associated Governments.

Bidders are reminded that the per Addendum # 2 **Bid Due Date is November 15, 2011 at 3:00 pm.**

The revisions and additional information described below are hereby made a part of the contract documents:

A. Changes to the Invitation for Bids (IFB):

1. Delete Article 4 Retention/Prompt Payment of the CONTRACT replace with:

ARTICLE 4. RETENTION/PROMPT PAYMENT

Pursuant to CFR 26.29, CONTRACTOR is required to pay all subcontractors for satisfactory performance no later than 30 days from when the CONTRACTOR receives payment from the AUTHORITY. AUTHORITY shall hold no retainage from CONTRACTOR. Any delay or postponement of payment may take place only for good cause and with AUTHORITY's prior written approval. Any violation of these provisions shall subject CONTRACTOR to the penalties, sanctions, and other remedies specified in Section 7108.5 of the California Business and Professions Code. This requirement shall not be construed to limit or impair any contractual, administrative or judicial remedies otherwise available to the CONTRACTOR or subcontractor in the event of; a dispute involving late payment or nonpayment by the CONTRACTOR; deficient subcontractor performance and/or non-compliance by a subcontractor. This Article applies to DBE and non-DBE contractors. CONTRACTOR shall submit "Prompt Payment Certificate" by 20th of each month.

2. Add Prompt Payment Certificate – Addendum # 4 Exhibit 1

B. Changes to the Special Provisions

1. In Book 2 of the special provisions, replace first sentence Section 5-1.09, PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS

No retainage will be held by the agency from progress payments due the prime contractor.

2. In Book 3 of the special provisions, Delete Addendum # 3 add Section, Jacked Pipe in Section 10-4.01 and replace with the following:

Jacked Pipe as shown on Plan Set C shall conform to the following requirements

PIPE JACKING (36-INCH JACKED STEEL CASING)

TUNNEL SAFETY ORDERS AND TUNNELING

Tunneling work for this project shall consist of mechanically placing a 36-inch jacked steel casing at the location shown on the plan and the manner depicted in the detail drawings, in conformance with the requirements of Section 65-1.05 “Jacking Pipe” of the Standard Specifications, and the Tunnel Safety Orders of the California Code of Regulations.

The work to be performed at the “I-15/La Mesa/Nisqualli interchange in Victorville, CA” has not yet been classified by the State Division of Occupational Safety and Health under Section 8422 of the Tunnel Safety Orders of the California Code of Regulations. A determination of **non-gassy** soil, rock, etc. for the tunneling operation is expected and is the basis for bidding.

The Contractor's attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. A change to the work as a direct result of the Contractor's planned operations that would cause work activities to fall under the requirements of the Tunnel Safety Orders, and that has not been shown on the plans or specified in these special provisions shall be reason for suspension of the work. The Contractor shall notify the Engineer not less than 20 days prior to worker exposure to a facility meeting the definition of a tunnel or shaft as described in Sections 8403 or 8405 of the Tunnel Safety Orders. The Department will obtain additional location classifications as may be necessary to allow the work to proceed.

The Contractor shall prominently post a notice of the classification and any special orders, rules, special conditions, or regulations at the tunnel work site and all personnel shall be informed of the classification.

At least 7 days prior to beginning work covered by these provisions, the Contractor shall submit the name of the person designated as the on-site Safety Representative to the Engineer along with proof of certification by the Division of Occupational Safety and Health as having met the requirements of Section 8406 of the Tunnel Safety Orders of the California Code of Regulations

Scope of Work

This work shall consist of furnishing and installing a 36-inch diameter steel casing and installing a carrier pipe and seals as shown on the plans or as directed by the Engineer and as specified in these special provisions.

Pipe Jacking is a trenchless construction method for installing a prefabricated pipe through the ground behind a shield or a tunnel-boring machine from a drive shaft to a reception shaft.

Auger boring is a trenchless construction method for installing a steel casing pipe through the ground jacked behind a rotating cutterhead of an auger boring machine from a drive shaft to a reception shaft. A carrier pipe of any suitable material may be installed inside the jacked casing.

This work is classified as “tunneling” and the contractors attention is directed to Section 5-1 “Tunnel Safety Orders and Tunneling of these Special Provisions

Attention is directed to Section 7-1.01 G, “Water Pollution”, of the Standard Specifications and these special provisions regarding handling and disposal of wastewater generated by the work. Wastewater resulting from the work shall not be allowed to enter the waterway and shall be disposed of outside the highway right of way in accordance with Section 7-1.13, “Disposal of Material Outside the Highway Right of Way”, of the Standard Specifications.

Flow Control

The Contractor shall provide for the control and diversion of flows in existing pipes or groundwater flow that may occur due to seasonal changes or natural conditions. When ground water level must be controlled, the Contractor shall use a system and equipment that is compatible with the properties, characteristics, and behavior of the soils as indicated by the soil investigation report. The bypass system shall be of adequate capacity and size to handle the flow. The Contractor’s operations shall minimize disturbance to the stream bed and banks, and at the conclusion of the work shall restore any disturbance to the pre-existing condition. Prior to beginning any flow diversion work, the Contractor shall submit a plan showing the intended work, any calculations supporting the sizing of the system and a schedule indicating the duration of the flow diversion to the Engineer for approval. No work within the existing pipe or adjacent waterway shall begin prior to approval of the flow control plan by the Engineer.

Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications and “Tunnel Safety Orders” of these special provisions.

Soils Investigation

Attention is directed to “Project Information” of these special provisions.

Materials.

36-inch diameter steel casing shall be as defined in Table A provided in this special provision, and shall conform to the material standards as contained in Table B in this special provision apply. Unless otherwise tested and approved by the State, the Contractor shall only use encasement pipe or uncased carrier pipe material that is new and has smooth interior and exterior walls and straight outside pipe walls with no bell modification.

Table A		
Product Suitability by Construction Method		
Type	Pipe/Casing Installation	Suitable Pipe/Casing
Pipe Jacking	Jacking	Steel
Auger Boring	Jacking	Steel

	Table B	
	Material Standards	
Material Type	Non-Pressure	Pressure
Steel	ASTM A139 Grade B(1) API 2B(2)	AWWA C200 API 2B(2)
(1) No hydrostatic test required (2) Dimensional tolerances only		

Steel Pipe Casing and Welds: In addition to meeting or exceeding the standards referenced in Table B in these special provisions, steel pipe casing shall meet the following requirements:

1. The size of the steel casing shall be at least 6 inches larger than the largest outside diameter of the carrier.
2. The casing pipe shall be spiral or straight seam welded pipe or seamless pipe.
3. All steel pipe may be bare inside and out, with the manufacturer's recommended minimum nominal wall thicknesses to meet the greater of either installation, loading or carrier requirements.
4. All steel casing pipe shall be square cut and have dead-even lengths, which are compatible with the pipe jacking or auger boring equipment.

The Contractor shall use steel pipe casings that meet or exceed the following minimum wall thickness requirements:

	Minimum Wall Thickness	
Casing Diameter	Up to 150 foot length	Over 150 foot length
36 in – 60 in	1/2 in	3/4 in

Steel Pipe Couplings and Joints: In addition to meeting or exceeding the standards referenced in Table B of these special provisions, to minimize potential for bore failure, couplings shall be flush and shall not project at right angles from the casing diameter. Pipe lengths may be joined by a mechanical press fit design with no internal or external bells (use Permalok couplings or equivalent) or field welding in conformance with the provisions of Section 49.5.02B "Splicing" of the Standard Specifications. Joints shall be airtight and continuous over the entire circumference of the pipe with a bead equal to or exceeding the minimum of either that required to meet the thickness criteria in these special provisions. A qualified welder shall perform all welding. When Permalok (or equivalent) couplings are used the casing joints do not need to be welded. Welded couplings shall have a full bead weld such that the thickness, when measured at an angle of 45 degrees to the casing and coupling interface, shall be no less than the casing thickness. It shall be the Contractor's responsibility to provide stress transfer across the joints, which is capable of resisting the jacking forces involved.

Submittals:

After contract approval, submittals are to be provided to the Engineer and a pre-construction conference will be held. The Engineer, Contractor, any Sub-Contractors and any involved parties shall attend.

The following submittals shall be provided to the Engineer. The Engineer shall have 15 working days for the review of these documents. If the submittals are determined to be incomplete, the Contractor shall have 5 days to re-submit completed submittals and the Engineer shall subsequently have 7

working days from the reception date of the latest submission to return comments back to the Contractor.

The pre-construction conference will be scheduled by the Engineer following his acceptance of complete submittals. Submittal format shall be a three-ring binder, divided into sections listed below with the identified information. No pipe jacking work shall begin prior to acceptance of a complete submittal package.

1. Manufacturers' data sheets and specifications describing in detail the pipe jacking or auger boring system including the equipment manufacturer's information for all power equipment to be used in the installation. Include the machine, jacking frame, and all ancillary equipment.
2. Detailed description of similar projects with references on which the proposed system had been successfully used by contractor/operator.
3. Description of method to remove and dispose of spoil including location of disposal sites and sample log of maintaining the volume of spoil material removal relative to the advancement of the casing (e.g. "Water shall be injected inside the casing to facilitate spoil removal. The point of injection shall be no closer than 2 feet from the leading edge of the casing.") Power Distribution System must be identified and spoil removal capability.
4. A description of the grade and alignment control system and indication of where the leading edge of the casing is located with respect to line and grade and the intervals for checking line and grade. Include manufacturer's literature and drawings showing setup, support provisions, and other details for the water level and laser or theodolite systems. Indication may be provided by using a water gauge (Dutch level) or electronic transmitting and receiving devices. Other methods must have prior approval.

Submit a description of surveying methods to confirm positions during construction. Submit a description of methods to ensure that thrust block, guide rails, and jacking frame are installed on proper line and grade. Submit results of line and grade survey to ensure that the thrust block, jacking frame, and guide rails are installed properly prior to launch of each drive. Confirm that these systems can achieve the required pipeline line and grade within the specified tolerances. Provide sample of maintaining a record of the progress.

5. Method for centering the cutting head inside the borehole.
6. Calculations: Calculations shall be submitted in a neat, legible format. Assumptions used in calculations shall be consistent with information provided in the Geotechnical Investigation Report. Attention is directed to "Project Information" of these special provisions. All calculations shall be prepared by professional engineer licensed in State of California, who shall stamp and sign calculations. Maximum anticipated jacking loads and supporting calculations.
 - a) Design calculations demonstrating that the proposed jacking pipe is capable of supporting the maximum stresses to be imposed during jacking. The calculations shall take into account earth and hydrostatic loads, jacking forces, external loads such as live loads due to traffic, and any other loads that may be reasonably anticipated during jacking. All loads shall be shown and described. Include assumed maximum drive length. Additionally, provide an estimate of the maximum jacking force expected to complete the drive, accounting for both face pressures and frictional resistance along the pipe string.

- b) Calculations demonstrating that the soils behind the thrust block can transfer the maximum planned jacking forces exerted by the main jacks to the ground during pipe installation with a factor of safety of at least 2.0, without excessive deflection or displacement.
- 7. Method for preventing voids and methods for grouting.
- 8. Shaft specification including: dimensions, locations, surface construction, profile, depth, method of excavation, shoring, bracing, and thrust block design. Include design and construction of jacking and receiving pits, special requirements for jacking and receiving pit penetrations, thrust blocks, backstops or other reactions required for casing pipe jacking or any other jacking, full calculations supporting maximum jacking capacity that jacking pit will withstand without movement exceeding 0.5 inches with an appropriate factor of safety, methods to control and dispose of ground water, areas for storage, ground stabilization if required, backfilling and other materials encountered in the maintenance and construction of pits and shafts. The Contractor shall submit jacking shaft layout drawings detailing dimensions and locations of all equipment, including overall work area boundaries and shall show that all equipment and operations shall be completely contained within the allowable work areas.
- 9. Pipe design data and specifications required to withstand jacking pressure.
- 10. Intermediate jacking station locations and design.
- 11. Description of lubrication injection system (i.e., bentonite slurry or other approved technique). Include manufacturer's literature and MSDS sheets. Include a description of proposed lubrication procedures during jacking, including estimated volumes of lubricant that will be pumped.
- 12. Layout plans and description of operational sequence including restoration of excavated areas.
- 13. A detailed plan for monitoring ground surface movement (settlement or heave) due to the jacking operation. The plan shall address the method, locations, and frequency of survey measurement outlined under this special provision. At minimum, the plan shall measure the ground movement of all structures, roadways, parking lots, and any other areas of concern within the calculated settlement trough of all Jacked pipelines and include a description of how settlements will be monitored and excessive settlement will be avoided and contingency plan to mitigate any excessive settlement. A pre-construction survey shall be performed by the Contractor, accompanied by the Engineer, to document pre-construction conditions. Provide pre-construction and post-construction assessment for building and structures located within a distance of 100 feet from centerline of proposed pipeline, and jacking and receiving pits. Include photographs or a video of existing damage to structures near alignment. Plans and working drawings for jacking operations shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.
- 14. Contingency plans for approval for the following potential conditions: damage to pipeline structural integrity and repair; loss and return to line and grade; and loss of ground, boring machine becoming stuck, inoperable or if an obstruction or utility is encountered, jacking forces increase dramatically or suddenly, jacking forces reach design capacity of pipe, jacking frame, or thrust block, grade tolerances exceeded and measures required if storm is anticipated.
- 15. Procedures to meet all applicable OSHA requirements. These procedures shall be submitted for a record purpose only and will not be subject to approval by the Engineer. At a minimum, the Contractor shall provide the following:
 - a) Protection against soil instability and ground water inflow.
 - b) Safety for shaft access and exit, including ladders, stairs, walkways, and hoists.

- c) Protection against injury from mechanical and hydraulic equipment operations, and for lifting and hoisting equipment and material.
- d) Ventilation and lighting.
- e) Monitoring for hazardous gases.
- f) Protection against flooding and means for emergency evacuation.
- g) Protection of shaft, including traffic barriers, accidental or unauthorized entry, and falling objects.
- h) Emergency protection equipment.
- i) Safety supervising responsibilities.

16. Samples of Daily Jacking records

Construction Site Requirements.

(a) Excavation for entry, exit, recovery pits, auger slurry sump pits, or any other excavation shall be in accordance with Section 19-2, "Roadway Excavation" of the Standard Specifications. Attention is directed to Section 5-1.02A "Excavation Safety Plans" of the Standard Specifications.

Unless approved by the Engineer, sump pits are required to contain auger fluids if vacuum devices are not operated throughout the boring operation.

(b) Within 48 hours of completing installation of the boring product, the site shall be cleaned of all excess auger fluids or spoils and restored to pre-construction conditions or as identified on the plans. Removal and final disposition of excess fluids or spoils is the responsibility of the Contractor and shall be disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

(c) Excavated areas shall be restored in accordance with the plans submitted by the Contractor and accepted by the Engineer as part of the submittals required under these special provisions.

(d) Provide for the safety of traffic and the public during construction. Attention is directed to Section 7-1.09 "Public Safety" of the Standard Specifications.

(e) Bore and Receiving Pits shall be protected by placement of 6-foot chain link fence and Type-K barrier around them and shored in accordance to Cal-OSHA requirements. Shoring of pits located within 15 feet of lanes within State highway right-of-way shall not extend more than 36 inches above the pavement grade. Reflectors shall be affixed to the shoring on all sides facing traffic. All pits shall have crushed-rock or concrete slabs and sump areas to clear groundwater and water used to clean casings. Pits shall be lined with filter fabric when groundwater is found and pumping is required in accordance with "Flow Control" of these special provisions.

Damage Restoration: Damaged State facilities caused by heaving, settlement, separation of pavement, escaping boring fluid (fracout) of the Jacking operation shall be replaced in-kind or repaired to their original state at no cost to the State. Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Quality Control.

General: The Contractor shall have a representative who is thoroughly knowledgeable of the equipment and boring procedures present at the job site during the entire installation and available to address immediate concerns and emergency operations. Notify the Engineer 48 hours in advance of starting work. Do not begin the installation until the Engineer is present at the job site and agrees that

proper preparations have been made. Attention is directed to Section 5-1.06 “Superintendence” of the Standard Specifications.

Subsurface monitoring: An independent Instrumentation Specialist shall install and monitor settlement monitoring points. The survey accuracy of the settlement monitoring points shall be within 0.01 feet. Settlements shall be evaluated using methods developed by Birger Schimdt and Peck (1969), Bennett (1998), or equivalent that are approved by the Engineer.

Subsurface monitoring points shall be installed at 5 feet and 10 feet above the crown of the proposed tunnel near the jacking shaft, above utilities, and on shoulders of roadways, before proceeding under critical locations. Additional points at non-critical locations shall be monitored to gain an early indication of workmanship. Additional surface settlement monitoring points may be used to supplement subsurface points. Surface settlement points shall be checked hourly when heading is within 25 feet, otherwise daily. If $\frac{1}{4}$ to $\frac{1}{2}$ inch settlement is detected, corrective action shall be taken, including but not limited to: filling voids with grout, limiting the radial overcut or filling the annulus with bentonite lubricant during tunneling. Changes in Contractor mean and methods may be appropriate and should be considered, such as position of cutting tools with respect to leading edge of casing and discontinuing use of high pressure cutting nozzles or jets etc.

Surface settlement points located in traffic lanes shall be checked before and after tunneling. If $\frac{1}{4}$ inch settlement is detected, corrective action shall be taken including but not limited to: filling voids with grout. Monitoring points shall be surveyed prior to tunneling to establish the baseline. Refer to Encroachment Permit Survey Grid (TR-0151) from Manual of Encroachment Permits on California Highways,, for settlement monitoring details

Product Locating and Tracking: The Contractor shall install all facilities such that their location can be readily determined by electronic designation after installation. For non-conductive installations, the Contractor shall attach a minimum of two separate and continuous conductive tracking (tone wire) materials, either externally, internally, or integral with the product. The Contractor shall use either a continuous green sheathed solid conductor copper wire line (minimum #12 AWG for external placement or minimum #14 AWG for internal placement in the conduit/casing) or a coated conductive tape. The Contractor shall ensure that conductors are located on opposite sides when installed externally. The Contractor shall connect any break in the conductor line before construction with an electrical clamp or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion.

Clamp connections shall be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors shall extend 2 feet beyond bore termini. Conductors must be tested for continuity. Identify each conductor that passes by removing the last 6 inches of the sheath. No deductions are allowed for failed tracking conductors. Failed conductor ends shall be wound into a small coil and left attached for future use.

Slurry Fluids: The Contractor shall use a mixture of bentonite clay and potable water with a minimum pH of 6.0 with other approved additives subject to Engineer’s approval to create the drilling fluid for soil stabilization. Fluid viscosity shall be varied to best fit the soil conditions encountered. Other chemicals or polymer surfactant in the drilling fluid shall not be used without written consent of the Engineer. The Contractor shall certify in writing to the Engineer that any chemicals to be added are environmentally safe and not harmful or corrosive to the facility. The Contractor shall identify the

source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH Test.

Failed Bore Path: If conditions warrant removal of any materials installed in a failed bore path, as determined by the Engineer, it will be at no cost to the Agency. The Contractor shall promptly inject grout into all voids created by products taken out of service

Pipe Jacking Operations (includes auger boring):

Installation Process: The Contractor shall ensure that pits and shafts are of sufficient size to accommodate equipment, the pipe selected and to allow for safe working practices. Use thrust blocks designed to distribute loads in a uniform manner so that any deflection of the thrust block is uniform and does not impart excessive loads on the shaft itself or cause the jacking frame to become misaligned.

The jacking system shall have the capability of pushing the pipe for pipe jacking operations through the ground in a controlled manner and be compatible with the anticipated jacking loads and pipe capacity. Monitor the jacking force applied to the pipe and do not exceed the pipe manufacturer's recommendations.

The Contractor shall ensure that the pipe lubrication system is functional at all times and sufficient to reduce jacking loads. Attention is directed to "Submittals" of these special provisions. The Contractor shall use pipe lubrication systems and pumps to convey lubricant to application points. Maintain sufficient fluids on site to avoid loss of lubrication.

Once jacking operation has commenced, it shall continue uninterrupted until the pipe has been jacked between the specified limits. This requirement may be modified if the Contractor submits to the Engineer for prior approval methods and details that shall prevent the "freezing" of the pipe and ensure that the heading is stable at all times. The driving ends of the pipe shall be properly protected against spalling and other damage. Any section of pipe showing failure shall be, at the option of the Engineer, repaired or removed and replaced with a new section that is adequate to the carry loads imposed upon it, at the Contractor's expense.

Auger Boring Operations:

Auger and casing shall be pushed simultaneously. The rear of the cutting head shall not advance in front of the leading edge of the casing by more than 1/3 times the casing diameter. In stable cohesive conditions the rear of the cutting head shall not advance in front of the leading edge of the casing by more than 8 inches.

In unstable conditions, such as granular soil, loose or flowable materials, the cutting head shall be retracted into the casing a distance that permits a balance between pushing pressure, pipe advancement and soil conditions. A suitable band welded around the leading edge of the casing shall be installed to provide additional strength in loose unstable materials when the cutting head has been retracted into the casing to reduce skin friction and to provide a method for the slurry lubricant to coat the outside of the casing.

If wing cutters are used, a maximum excavation of 1 inch to the outside diameter of the steel casing shall be permitted. Voids in excess shall be grouted.

Provide at least 20 feet [6.1 m] of full diameter auger at the leading end of the casing. Subsequent auger size may be reduced, but the reduced auger diameter shall be at least 75% of the full auger diameter. The length of auger strand shall be equal to that of the section of steel casing.

No conduit may be left open ended without approval of the Engineer to prevent the conduit from acting as a drainage structure prior to finished installation.

Auger boring equipment selected for the project shall be suitable for and capable of efficiently advancing through the geologic conditions described in the Geotechnical Report. The machine shall be capable of excavating cobbles or boulders or other objects up to 30% of the outside diameter of the augers. Attention is directed to “Project Information” of these special provisions.

Upon completion of the jacking operations, all voids generated between the steel casing and the surrounding soil in the course shall be filled with grout. Attention is directed to “Submittals” of these special provisions. Grout ports when placed inside of the pipe shall include predrilled grout holes filled with threaded fittings and shall be placed on 8 foot centers longitudinally and offset 22 degrees from the vertical, staggered to the left and right of the top longitudinal axis of the pipe. Upon completion of grouting, holes shall be plugged with steel caps.

The carrier pipe shall be installed after successful installation of casing pipe. Carrier pipe shall be installed by first attaching wooden skids or pre-manufactured casing spacers to the carrier pipe before assembly. The carrier pipe shall be installed, one piece at a time, from either the entry or exit pit. Carrier pipe may be installed by pushing by hand or with a boring/jacking machine, or by pulling with a winch, or other methods. All voids in the annular spacing between the carrier pipe and the casing shall be filled with sand. The Contractor shall notify the Engineer if the entire annular space between the pipe and the casing cannot be filled with sand prior to starting sand fill work. Equipment and material for placing sand fill shall be on the work site before jacking operations are completed in order that grouting may be started immediately after the jacking operations are finished and completed within 48 hours of the completion of the bore.

Sand fill for the annular void between the carrier pipe and the steel casing shall be silica sand free of asbestos and other deleterious materials

Prior to placing sand fill in the annular space, the steel casing shall be free from water and debris.

Ends of casing shall be sealed with mortar, neoprene seals or another approved method.

Excess Material and Fluids: The Contractor shall monitor the pumping rate, pressures, viscosity and density of the boring fluids to ensure adequate removal of soil cuttings and the stability of the borehole. The Contractor shall contain excess drilling fluids, slurry and soil cuttings at entry and exit points in pits until they are recycled or removed from the site.

The Contractor shall ensure that all boring fluids are disposed of or recycled in a manner acceptable to the appropriate local, state or federal regulatory agencies. When jacking and boring in suspected contaminated ground, the Contractor shall test the boring fluid for contamination and dispose of appropriately. The Contractor shall remove any excess material upon completion of the bore. If the Contractor suspects or it becomes evident that the soil is contaminated, the Contractor shall contact the Engineer immediately. The Contractor shall not continue boring without the Engineer’s approval.

Boring Failure: If an obstruction is encountered which prevents completion of the installation in accordance with the design location and specifications; the pipe may be taken out of service and left in place at the discretion of the Engineer. The Contractor shall immediately fill the product left in place with excavatable flowable fill. The Contractor shall submit a new installation procedure and revised plans to the Engineer for approval before resuming work at another location. If damage is observed to any property, the Contractor shall cease all work until a plan of action to minimize further damage and restore damaged property is submitted and approved by the Engineer.

Documentation Requirements.

Boring Path Report:

Show the crown elevation, diameter and material type of all utilities located and physically observed during the subsoil investigation. For all other obstructions encountered during subsoil investigation or the installation, show the type of material, horizontal and vertical location, top elevation and lowest elevation observed, and note if the obstruction continues below the lowest point observed.

Plans and working drawings for jacking operations shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

Daily logs and records:

The Contractor shall submit the following daily logs and records. Daily logs and records (recorded electronically and manually) shall be provided to the Engineer by noon on the day following the shift for which the data or records were taken.

1. Jacking Records: The Contractor shall provide complete jacking records to the Engineer. These records shall include, at a minimum: date, time, name of operator, tunnel drive identification, installed casing/pipe and corresponding tunnel length, rate of advance, jacking forces, volume, and location of any lubricant pumped, problems encountered with the auger or tunnel boring machine or other components or equipment, and durations and reasons for delays. Observations should be recorded at intervals of not less than three times per pipe, as conditions change, and as directed by the Engineer.
2. Lubrication Records: The Contractor shall provide lubrication records to the Engineer. These records shall include the injection locations along the pipe string and amount, in gallons, of lubricant pumped throughout a drive. The record will also include the type of additive used and date, time, and drive distance when used.

Testing:

Product Testing: When there is any indication that the installed product has sustained damage and may leak, the Contractor shall stop the work, notify the Engineer and investigate the damage. The Engineer may require a hydrostatic pressure test and reserves the right to be present during the test. The Contractor shall perform the hydrostatic pressure test within 24 hours unless otherwise approved by the Engineer and shall furnish a copy of the test results to the Engineer for review and approval. The Engineer shall be allowed up to 72 hours to approve or determine if the product installation is not in compliance with specifications.

Testing Methods: Testing shall consist of the following method.

Water leakage test for leak resistant joints

The test for a leak resistant joint shall allow a maximum field leakage rate of up 1,000 gallons per inch of nominal diameter per mile of pipe length per day, with a hydrostatic head of 6 feet above the crown. At your option, upon approval of the Engineer, you may use an air based joint-by-joint leakage test method.

Finished Installation Inspection

Either a human or a CCTV inspection shall be made of the finished J & B installation. A copy of the recording shall be given to the Engineer prior to project acceptance. Format of the video shall be

MPEG. For human entry inspections, a written log with photographs of any problem spots and notation of location shall be given to the Engineer prior to project acceptance

Measurement and Payment.

The length of pipe jacking to be paid for will be the slope length as designated on the plans and confirmed by the Engineer. Jacked pipe placed in excess of the length designated will not be paid for. The method of measurement will be the actual length of the installation, measured in place along the surface of the ground, complete and accepted. No additions or deductions will be made for sweeps in either the vertical or horizontal direction to complete the installation.

The contract price paid per linear foot for pipe jacking, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, inspecting and testing, complete in place, including excavation of boring/jacking pits, excavation of receiving pits, shoring, dewatering, casings, removal of excavated materials and spoils, removal and disposal of drilling fluids, backfilling complete restoration of the site, diverting existing stream or groundwater flow, CCTV inspections of and televising finished installation, and disposal of residue from cleaning, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Price and payment will be full compensation for all work and materials required to complete the work specified in this Section, including, excavation of boring/jacking pits, excavation of receiving pits, shoring, dewatering, furnishing and installing casings and carrier pipe, from plan point of beginning to plan point of ending at plan depth, removal of excavated materials and spoils, removal and disposal of drilling fluids, backfilling, and complete restoration of the site.

No payment will be made for failed bore paths, injection of excavatable flowable fill, products taken out of service or incomplete installations. No payment will be made until a Bore Path Report has been delivered to the Engineer.